



SEQUENCE LISTING

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<120> METHODS AND COMPOSITIONS FOR POLYPEPTIDE ENGINEERING

<130> 02-020502US

<140> 09/344,002

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<150> 08/769,062

<151> 1996-12-18

<150> 08/198,431

<151> 1994-02-17

<150> 08/425,684

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<150> 08/537,874

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<160> 101

<170> PatentIn Ver. 2.0

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oligonucleotide used for codon usage library

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<211> 38

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: degenerate
oligonucleotide used for codon usage library

<400> 2

aaccctccag ttccgaaccc catatgaaaa aaaccgct 38

<210> 3

<211> 40

<212> DNA

<213> Artificial Sequence

<220>
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 oligonucleotide used for codon usage library

<400> 3
 aaccctccag ttccgaaccc atatacatat gcgtgctaaa 40

<210> 4
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 <212> DNA
 <213> Artificial Sequence

<220>
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 oligonucleotide used for codon usage library

<400> 4
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<210> 5
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 <213> Artificial Sequence

<220>
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 oligonucleotide used for codon usage library

<400> 5
 aaccctccag ttccgaaccc gatatacata tgaaacagtc 40

<210> 6
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 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

<400> 6
 tgggtgttatg tctgctcagg cdatggcdgt dgayttypay ctggttccgg ttgaagagga 60

<210> 7
 <211> 60
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

<400> 7
 ggctggtttc gctaccgttg cdcargcdgc dccdaargay ctggttccgg ttgaagagga 60

<210> 8
 <211> 60

<212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

 <400> 8
 caccgccgac gctatctctt cyttygcdtc yacyggytcy ctgggtccgg ttgaagagga 60

 <210> 9
 <211> 60
 <212> DNA
 <213> Artificial Sequence

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 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

 <400> 9
 gctgctggct gctcagccgg cdatggcdat ggayatyggy ctgggtccgg ttgaagagga 60

 <210> 10
 <211> 61
 <212> DNA
 <213> Artificial Sequence

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 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

 <400> 10
 tgccgtgct gttcaccgccg gtdacyaarg cdgcdcargt dctgggtccg gttgaagagg 60
 a 61

 <210> 11
 <211> 60
 <212> DNA
 <213> Artificial Sequence

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 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

 <400> 11
 cccggctttc tggaaccgctc argcdgcdca rgcdctggac gttgctaaaa aactgcagcc 60

 <210> 12
 <211> 60
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

 <400> 12

acgttatcct gttcctgggt gayggyatgg gygtdccdac cgttaccgct acccgatatcc 60

<210> 13

<211> 60

<212> DNA

<213> Artificial Sequence

<220>

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oligonucleotide used for codon usage library

<400> 13

aaactggggtc cggaaacccc dctggcdatg gaycarttyc cgtacgttgc tctgtctaaa 60

<210> 14

<211> 60

<212> DNA

<213> Artificial Sequence

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oligonucleotide used for codon usage library

<400> 14

ggttccggac tctgctggta cygcdacygc dtayctgtgc ggtgttaaag gtaactaccg 60

<210> 15

<211> 60

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: degenerate
oligonucleotide used for codon usage library

<400> 15

ctgctcgta caaccagtgc aaracyacyc gyggyaayga agttacctct gttatgaacc 60

<210> 16

<211> 60

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: degenerate
oligonucleotide used for codon usage library

<400> 16

tctgttggtg ttgttaccac yacycgygt carcaygtd ctccggctgg tgcttacgct 60

<210> 17

<211> 60

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: degenerate

oligonucleotide used for codon usage library

<400> 17

gtactctgac gctgacctgc cdgcdgaygc dcaratgaac ggttgccagg acatcgctgc 60

<210> 18

<211> 60

<212> DNA

<213> Artificial Sequence

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oligonucleotide used for codon usage library

<400> 18

acatcgacgt tatcctgggt ggyggycgya artayatgtt cccggttggt accccggacc 60

<210> 19

<211> 60

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: degenerate
oligonucleotide used for codon usage library

<400> 19

tctgttaacg gtgttcgtaa rcgyaarc ar aayctggtdc aggcttggca ggctaaacac 60

<210> 20

<211> 60

<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence: degenerate
oligonucleotide used for codon usage library

<400> 20

gaaccgtacc gctctgctgc argcdgcdga ygaytcytct gttaccacc t gatgggtct 60

<210> 21

<211> 60

<212> DNA

<213> Artificial Sequence

<220>

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oligonucleotide used for codon usage library

<400> 21

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<210> 22

<211> 60

<212> DNA

<213> Artificial Sequence

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 oligonucleotide used for codon usage library

 <400> 22
 aacccgcgtg gtttctacct gtttgtdgar ggyggycgya tcgaccacgg tcaccacgac 60

 <210> 23
 <211> 60
 <212> DNA
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 oligonucleotide used for codon usage library

 <400> 23
 gaccgaagct ggtatgttcg ayaaygdat ygcdaargct aacgaactga cctctgaact 60

 <210> 24
 <211> 60
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

 <400> 24
 ccgctgacca ctctcacgtt ttytcttyg gyggytayac cctgcgtggt acctctatct 60

 <210> 25
 <211> 60
 <212> DNA
 <213> Artificial Sequence

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 oligonucleotide used for codon usage library

 <400> 25
 gctctggact ctaaacttta yacytctycty ctgtaygggya acggtccggg ttacgctctg 60

 <210> 26
 <211> 60
 <212> DNA
 <213> Artificial Sequence

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 oligonucleotide used for codon usage library

 <400> 26
 cgtaacgac tctacctctg argayccdtc ytaycarcag caggctgctg ttccgcaggc 60

 <210> 27

<211> 60
 <212> DNA
 <213> Artificial Sequence

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 oligonucleotide used for codon usage library

 <400> 27
 aagacgttgc tgtttttcgct cgyggyccdc argcdca yct ggttcacggt gttgaagaag 60

 <210> 28
 <211> 60
 <212> DNA
 <213> Artificial Sequence

 <220>
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 oligonucleotide used for codon usage library

 <400> 28
 atggctttcg ctggttgcgt dgarccdtay acygaytg ya acctgccggc tccgaccacc 60

 <210> 29
 <211> 61
 <212> DNA
 <213> Artificial Sequence

 <220>
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 oligonucleotide used for codon usage library

 <400> 29
 tgctcacctg gctgcttmac cdccdccdet ggcdctgctg gctggtgcta tgctgctcct 60
 c 61

 <210> 30
 <211> 62
 <212> DNA
 <213> Artificial Sequence

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 oligonucleotide used for codon usage library

 <400> 30
 ttccgcctct agagaattct tartacagrg thgghgccag gaggagcagc atagcaccag 60
 cc 62

 <210> 31
 <211> 58
 <212> DNA
 <213> Artificial Sequence

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 oligonucleotide used for codon usage library

<400> 31
aagcagccag gtgagcagcg tchggratrg argthgcggt ggtcggagcc ggcagggt 58

<210> 32
<211> 60
<212> DNA
<213> Artificial Sequence

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<223> Description of Artificial Sequence: degenerate
oligonucleotide used for codon usage library

<400> 32
cgcaaccagc gaaagccatg atrtghgcha craargtytc ttcttcaaca ccgtgaacca 60

<210> 33
<211> 60
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: degenerate
oligonucleotide used for codon usage library

<400> 33
gcgaaaacag caacgtcttc rccrcrtgr gtytcrgahg cctgcggaac agcagcctgc 60

<210> 34
<211> 60
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: degenerate
oligonucleotide used for codon usage library

<400> 34
agaggtagag tcgttaacgt chggrcgrga rccrccrccc agagcgtaac ccggaccgtt 60

<210> 35
<211> 60
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: degenerate
oligonucleotide used for codon usage library

<400> 35
aagatttaga gtccagagct ttrgahgghg ccagrccraa gatagaggta ccacgcaggg 60

<210> 36
<211> 60
<212> DNA
<213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

 <400> 36
 acgtgagagt ggtcagcgggt haccagratc agrgtrtcca gttcagaggt cagttcgtta 60

 <210> 37
 <211> 60
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

 <400> 37
 gaacatacca gcttcggtca ghgccatrta hgcyttrtcg tcgtggtgac cgtggtcgat 60

 <210> 38
 <211> 60
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

 <400> 38
 ggtagaaacc acgcgggtta cgrgahacha crcgcaghgc aacttcggtc atttcctgca 60

 <210> 39
 <211> 60
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

 <400> 39
 tcctgctgaa cgttgtatatt catrtchgch ggytcraaca gacccatcag gtgggtaaca 60

 <210> 40
 <211> 60
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

 <400> 40
 cagcagagcg gtacggttcc ahacrtaytg hgcrccytgg tgtttagcct gccaaagcctg 60

 <210> 41
 <211> 60

<212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

 <400> 41
 tacgaacacc gttaacagaa gcrtcrtchg grtaytchgg gtccggggta ccaaccggga 60

 <210> 42
 <211> 60
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

 <400> 42
 cccaggataa cgtcgatgtc catrttrtth accagytghg cagcgatgtc ctggcaaccg 60

 <210> 43
 <211> 60
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

 <400> 43
 caggtcagcg tcagagtacc arttrcgrtt hacrgtrtga gcgtaagcac cagccggaga 60

 <210> 44
 <211> 60
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

 <400> 44
 tggttaacaac accaacagat ttrcchgcyt tytthgcrcg gttcataaca gaggtaactt 60

 <210> 45
 <211> 60
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

 <400> 45
 cactggttgt aacgagcagc hgcrghacr ccratrgtrc ggtagttacc tttaacaccg 60

<210> 46
 <211> 60
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

 <400> 46
 accagcagag tccggaacct ggcgrtchac rttrtargtt ttagacagag caacgtacgg 60

 <210> 47
 <211> 60
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

 <400> 47
 gggtttccgg acccagttta ccrttcatyt grccyttcag gatacgggta gcggtaacgg 60

 <210> 48
 <211> 60
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

 <400> 48
 cccaggaaca ggataacggt ytthgchgcr gtytgrathg gctgcagttt ttagcaacg 60

 <210> 49
 <211> 42
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

 <400> 49
 acggttccag aaagccgggt cttcctcttc aaccggaacc ag 42

 <210> 50
 <211> 60
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

<400> 50
cctgagcaga cataacacca gchgchachg chachgccag cggcagttta cgcagggtga 60

<210> 51

<211> 62

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: degenerate
oligonucleotide used for codon usage library

<400> 51

accggggtga acagcagcgg cagcaghgcc aghgcratrg trgactgttt catagtata 60
tc 62

<210> 52

<211> 59

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: degenerate
oligonucleotide used for codon usage library

<400> 52

gccggctgag cagccagcag cagcagrcch gchgchgcgg tcggcagcag gtagtttca 59

<210> 53

<211> 60

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: degenerate
oligonucleotide used for codon usage library

<400> 53

aagatatagc gatcggggtg gtcaghacra trccagcag tttagcacgc atatgtatat 60

<210> 54

<211> 58

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: degenerate
oligonucleotide used for codon usage library

<400> 54

caacggtagc gaaaccagcc aghgchachg crathgcrat agcggttttt ttcatatg 58

<210> 55

<211> 39

<212> DNA

<213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

<400> 55
 agaattctct agaggcggaa actctccaac tcccagggtt 39

<210> 56
 <211> 39
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for codon usage library

<400> 56
 tgagaggttg agggccaat tgggaggtca aggcttggg 39

<210> 57
 <211> 18
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for alpha interferon
 shuffling

<400> 57
 tgtratctgy ctsagacc 18

<210> 58
 <211> 23
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for alpha interferon
 shuffling

<400> 58
 ggcacaaatg vgmagaatct ctc 23

<210> 59
 <211> 22
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for alpha interferon
 shuffling

<400> 59

agagattctk cbcatttgtg cc	22
<210> 60	
<211> 24	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Description of Artificial Sequence: degenerate oligonucleotide used for alpha interferon shuffling	
<400> 60	
cagttccaga agrctsmagc catc	24
<210> 61	
<211> 24	
<212> DNA	
<213> Artificial Sequence	
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<223> Description of Artificial Sequence: degenerate oligonucleotide used for alpha interferon shuffling	
<400> 61	
gatggctksa gycttctgga actg	24
<210> 62	
<211> 19	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Description of Artificial Sequence: degenerate oligonucleotide used for alpha interferon shuffling	
<400> 62	
cttcaatctc ttcascaca	19
<210> 63	
<211> 19	
<212> DNA	
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<220>	
<223> Description of Artificial Sequence: degenerate oligonucleotide used for alpha interferon shuffling	
<400> 63	
tgtgstgaag agattgaag	19
<210> 64	
<211> 18	
<212> DNA	

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: degenerate
oligonucleotide used for alpha interferon
shuffling

<400> 64

ggawsagass ctcctaga

18

<210> 65

<211> 18

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: degenerate
oligonucleotide used for alpha interferon
shuffling

<400> 65

tctaggagss tctswtcc

18

<210> 66

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: degenerate
oligonucleotide used for alpha interferon
shuffling

<400> 66

gaacttdwcc agcaamtgaa t

21

<210> 67

<211> 21

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: degenerate
oligonucleotide used for alpha interferon
shuffling

<400> 67

attcakttgc tggwhaagtt c

21

<210> 68

<211> 19

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: degenerate
oligonucleotide used for alpha interferon

shuffling

<400> 68
ggactycatc ctggctgtg 19

<210> 69
<211> 19
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: degenerate
oligonucleotide used for alpha interferon
shuffling

<400> 69
cacagccagg atgragtcc 19

<210> 70
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: degenerate
oligonucleotide used for alpha interferon
shuffling

<400> 70
aagaatcact ctttatct 18

<210> 71
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: degenerate
oligonucleotide used for alpha interferon
shuffling

<400> 71
agataaagag tgattctt 18

<210> 72
<211> 19
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: degenerate
oligonucleotide used for alpha interferon
shuffling

<400> 72
tgggaggttg tcagagcag 19

<210> 73
 <211> 19
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for alpha interferon
 shuffling

<400> 73
 ctgctctgac aacctccca 19

<210> 74
 <211> 18
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: degenerate
 oligonucleotide used for alpha interferon
 shuffling

<400> 74
 tcawtccttm ctcyttaa 18

<210> 75
 <211> 166
 <212> PRT
 <213> consensus alpha interferon

<400> 75
 Cys Asp Leu Pro Gln Thr His Ser Leu Gly Asn Arg Arg Ala Leu Ile
 1 5 10 15

Leu Leu Ala Gln Met Gly Arg Ile Ser Pro Phe Ser Cys Leu Lys Asp
 20 25 30

Arg His Asp Phe Gly Phe Pro Gln Glu Glu Phe Asp Gly Asn Gln Phe
 35 40 45

Gln Lys Ala Gln Ala Ile Ser Val Leu His Glu Met Ile Gln Gln Thr
 50 55 60

Phe Asn Leu Phe Ser Thr Lys Asp Ser Ser Ala Ala Trp Glu Gln Ser
 65 70 75 80

Leu Leu Glu Lys Phe Ser Thr Glu Leu Tyr Gln Gln Leu Asn Asp Leu
 85 90 95

Glu Ala Cys Val Ile Gln Glu Val Gly Val Glu Glu Thr Pro Leu Met
 100 105 110

Asn Glu Asp Ser Ile Leu Ala Val Arg Lys Tyr Phe Gln Arg Ile Thr
 115 120 125

Leu Tyr Leu Thr Glu Lys Lys Tyr Ser Pro Cys Ala Trp Glu Val Val

130

135

140

Arg Ala Glu Ile Met Arg Ser Leu Ser Phe Ser Thr Asn Leu Gln Lys
 145 150 155 160

Arg Leu Arg Arg Lys Asp
 165

<210> 76

<211> 166

<212> PRT

<213> human alpha interferon

<400> 76

Cys Asp Leu Pro Gln Thr His Ser Leu Gly Asn Arg Arg Ala Leu Ile
 1 5 10 15

Leu Leu Ala Gln Met Gly Arg Ile Ser Pro Phe Ser Cys Leu Lys Asp
 20 25 30

Arg His Asp Phe Gly Leu Pro Gln Glu Glu Phe Asp Gly Asn Gln Phe
 35 40 45

Gln Lys Thr Gln Ala Ile Pro Val Leu His Glu Met Ile Gln Gln Thr
 50 55 60

Phe Asn Leu Phe Ser Thr Glu Asp Ser Ser Ala Ala Trp Glu Gln Ser
 65 70 75 80

Leu Leu Glu Lys Phe Ser Thr Glu Leu Tyr Gln Gln Leu Asn Asn Leu
 85 90 95

Glu Ala Cys Val Ile Gln Glu Val Gly Met Glu Glu Thr Pro Leu Met
 100 105 110

Asn Glu Asp Ser Ile Leu Ala Val Arg Lys Tyr Phe Gln Arg Ile Thr
 115 120 125

Leu Tyr Leu Thr Glu Lys Lys Tyr Ser Pro Cys Ala Trp Glu Val Val
 130 135 140

Arg Ala Glu Ile Met Arg Ser Leu Ser Phe Ser Thr Asn Leu Gln Lys
 145 150 155 160

Arg Leu Arg Arg Lys Asp
 165

<210> 77

<211> 166

<212> PRT

<213> human alpha interferon

<400> 77

Cys Asp Leu Pro Gln Thr His Ser Leu Gly Asn Arg Arg Ala Leu Ile
 1 5 10 15

Leu Leu Ala Gln Met Gly Arg Ile Ser Pro Phe Ser Cys Leu Lys Asp
 20 25 30
 Arg Pro Asp Phe Gly Leu Pro Gln Glu Glu Phe Asp Gly Asn Gln Phe
 35 40 45
 Gln Lys Thr Gln Ala Ile Ser Val Leu His Glu Met Ile Gln Gln Thr
 50 55 60
 Phe Asn Leu Phe Ser Thr Glu Asp Ser Ser Ala Ala Trp Glu Gln Ser
 65 70 75 80
 Leu Leu Glu Lys Phe Ser Thr Glu Leu Tyr Gln Gln Leu Asn Asn Leu
 85 90 95
 Glu Ala Cys Val Ile Gln Glu Val Gly Met Glu Glu Thr Pro Leu Met
 100 105 110
 Asn Glu Asp Ser Ile Leu Ala Val Arg Lys Tyr Phe Gln Arg Ile Thr
 115 120 125
 Leu Tyr Leu Thr Glu Lys Lys Tyr Ser Pro Cys Ala Trp Glu Val Val
 130 135 140
 Arg Ala Glu Ile Met Arg Ser Leu Ser Phe Ser Thr Asn Leu Gln Lys
 145 150 155 160
 Ile Leu Arg Arg Lys Asp
 165

<210> 78
 <211> 166
 <212> PRT
 <213> human alpha interferon

<400> 78
 Cys Asn Leu Ser Gln Thr His Ser Leu Asn Asn Arg Arg Thr Leu Met
 1 5 10 15
 Leu Leu Ala Gln Met Arg Arg Ile Ser Pro Phe Ser Cys Leu Lys Asp
 20 25 30
 Arg His Asp Phe Glu Phe Pro Gln Glu Glu Phe Asp Gly Asn Gln Phe
 35 40 45
 Gln Lys Ala Gln Ala Ile Ser Val Leu His Glu Met Met Gln Gln Thr
 50 55 60
 Phe Asn Leu Phe Ser Thr Lys Asn Ser Ser Ala Ala Trp Asp Glu Thr
 65 70 75 80
 Leu Leu Glu Lys Phe Tyr Ile Glu Leu Phe Gln Gln Met Asn Asp Leu
 85 90 95
 Glu Ala Cys Val Ile Gln Glu Val Gly Val Glu Glu Thr Pro Leu Met

<212> PRT
 <213> human alpha interferon

<400> 80

Cys	Asp	Leu	Pro	Gln	Thr	His	Ser	Leu	Gly	His	Arg	Arg	Thr	Met	Met
1				5					10					15	
Leu	Leu	Ala	Gln	Met	Arg	Arg	Ile	Ser	Leu	Phe	Ser	Cys	Leu	Lys	Asp
			20					25					30		
Arg	His	Asp	Phe	Arg	Phe	Pro	Gln	Glu	Glu	Phe	Asp	Gly	Asn	Gln	Phe
		35					40					45			
Gln	Lys	Ala	Glu	Ala	Ile	Ser	Val	Leu	His	Glu	Val	Ile	Gln	Gln	Thr
	50					55					60				
Phe	Asn	Leu	Phe	Ser	Thr	Lys	Asp	Ser	Ser	Val	Ala	Trp	Asp	Glu	Arg
65					70					75					80
Leu	Leu	Asp	Lys	Leu	Tyr	Thr	Glu	Leu	Tyr	Gln	Gln	Leu	Asn	Asp	Leu
			85						90					95	
Glu	Ala	Cys	Val	Met	Gln	Glu	Val	Trp	Val	Gly	Gly	Thr	Pro	Leu	Met
			100					105					110		
Asn	Glu	Asp	Ser	Ile	Leu	Ala	Val	Arg	Lys	Tyr	Phe	Gln	Arg	Ile	Thr
		115					120					125			
Leu	Tyr	Leu	Thr	Glu	Lys	Lys	Tyr	Ser	Pro	Cys	Ala	Trp	Glu	Val	Val
	130					135					140				
Arg	Ala	Glu	Ile	Met	Arg	Ser	Phe	Ser	Ser	Ser	Arg	Asn	Leu	Gln	Glu
145					150					155					160
Arg	Leu	Arg	Arg	Lys	Glu										
				165											

<210> 81

<211> 166

<212> PRT

<213> human alpha interferon

<400> 81

Cys	Asp	Leu	Pro	Gln	Thr	His	Ser	Leu	Arg	Asn	Arg	Arg	Ala	Leu	Ile
1				5					10					15	
Leu	Leu	Ala	Gln	Met	Gly	Arg	Ile	Ser	Pro	Phe	Ser	Cys	Leu	Lys	Asp
			20					25					30		
Arg	His	Glu	Phe	Arg	Phe	Pro	Glu	Glu	Glu	Phe	Asp	Gly	His	Gln	Phe
		35					40					45			
Gln	Lys	Thr	Gln	Ala	Ile	Ser	Val	Leu	His	Glu	Met	Ile	Gln	Gln	Thr
	50					55					60				
Phe	Asn	Leu	Phe	Ser	Thr	Glu	Asp	Ser	Ser	Ala	Ala	Trp	Glu	Gln	Ser

65		70		75		80
Leu Leu Glu Lys Phe Ser Thr Glu Leu Tyr Gln Gln Leu Asn Asp Leu						
	85			90		95
Glu Ala Cys Val Ile Gln Glu Val Gly Val Glu Glu Thr Pro Leu Met						
	100			105		110
Asn Glu Asp Phe Ile Leu Ala Val Arg Lys Tyr Phe Gln Arg Ile Thr						
	115			120		125
Leu Tyr Leu Met Glu Lys Lys Tyr Ser Pro Cys Ala Trp Glu Val Val						
	130			135		140
Arg Ala Glu Ile Met Arg Ser Phe Ser Phe Ser Thr Asn Leu Lys Lys						
	145			150		155
						160
Gly Leu Arg Arg Lys Asp						
						165

<210> 82
 <211> 166
 <212> PRT
 <213> human alpha interferon

<400> 82
Cys Asp Leu Pro Gln Thr His Ser Leu Gly Asn Arg Arg Ala Leu Ile
1 5 10 15
Leu Leu Ala Gln Met Arg Arg Ile Ser Pro Phe Ser Cys Leu Lys Asp
20 25 30
Arg His Asp Phe Glu Phe Pro Gln Glu Glu Phe Asp Asp Lys Gln Phe
35 40 45
Gln Lys Ala Gln Ala Ile Ser Val Leu His Glu Met Ile Gln Gln Thr
50 55 60
Phe Asn Leu Phe Ser Thr Lys Asp Ser Ser Ala Ala Leu Asp Glu Thr
65 70 75 80
Leu Leu Asp Glu Phe Tyr Ile Glu Leu Asp Gln Gln Leu Asn Asp Leu
85 90 95
Glu Ser Cys Val Met Gln Glu Val Gly Val Ile Glu Ser Pro Leu Met
100 105 110
Tyr Glu Asp Ser Ile Leu Ala Val Arg Lys Tyr Phe Gln Arg Ile Thr
115 120 125
Leu Tyr Leu Thr Glu Lys Lys Tyr Ser Ser Cys Ala Trp Glu Val Val
130 135 140
Arg Ala Glu Ile Met Arg Ser Phe Ser Leu Ser Ile Asn Leu Gln Lys
145 150 155 160

Arg Leu Lys Ser Lys Glu
165

<210> 83

<211> 166

<212> PRT

<213> human alpha interferon

<400> 83

Cys Asp Leu Pro Glu Thr His Ser Leu Asp Asn Arg Arg Thr Leu Met
1 5 10 15

Leu Leu Ala Gln Met Ser Arg Ile Ser Pro Ser Ser Cys Leu Met Asp
20 25 30

Arg His Asp Phe Gly Phe Pro Gln Glu Glu Phe Asp Gly Asn Gln Phe
35 40 45

Gln Lys Ala Pro Ala Ile Ser Val Leu His Glu Leu Ile Gln Gln Ile
50 55 60

Phe Asn Leu Phe Thr Thr Lys Asp Ser Ser Ala Ala Trp Asp Glu Asp
65 70 75 80

Leu Leu Asp Lys Phe Cys Thr Glu Leu Tyr Gln Gln Leu Asn Asp Leu
85 90 95

Glu Ala Cys Val Met Gln Glu Glu Arg Val Gly Glu Thr Pro Leu Met
100 105 110

Asn Ala Asp Ser Ile Leu Ala Val Lys Lys Tyr Phe Arg Arg Ile Thr
115 120 125

Leu Tyr Leu Thr Glu Lys Lys Tyr Ser Pro Cys Ala Trp Glu Val Val
130 135 140

Arg Ala Glu Ile Met Arg Ser Leu Ser Leu Ser Thr Asn Leu Gln Glu
145 150 155 160

Arg Leu Arg Arg Lys Glu
165

<210> 84

<211> 166

<212> PRT

<213> human alpha interferon

<400> 84

Cys Asp Leu Pro Gln Thr His Ser Leu Gly Asn Arg Arg Ala Leu Ile
1 5 10 15

Leu Leu Ala Gln Met Gly Arg Ile Ser Pro Phe Ser Cys Leu Lys Asp
20 25 30

Arg His Asp Phe Gly Phe Pro Gln Glu Glu Phe Asp Gly Asn Gln Phe

35	40	45
Gln Lys Ala Gln Ala Ile Ser Val Leu His Glu Met Ile Gln Gln Thr		
50	55	60
Phe Asn Leu Phe Ser Thr Lys Asp Ser Ser Ala Ile Trp Glu Gln Ser		
65	70	75 80
Leu Leu Glu Lys Phe Ser Thr Glu Leu Asn Gln Gln Leu Asn Asp Met		
	85	90 95
Glu Ala Cys Val Ile Gln Glu Val Gly Val Glu Glu Thr Pro Leu Met		
	100	105 110
Asn Val Asp Ser Ile Leu Ala Val Lys Lys Tyr Phe Gln Arg Ile Thr		
	115	120 125
Leu Tyr Leu Thr Glu Lys Lys Tyr Ser Pro Cys Ala Trp Glu Val Val		
	130	135 140
Arg Ala Glu Ile Met Arg Ser Phe Ser Leu Ser Lys Ile Phe Gln Glu		
145	150	155 160
Arg Leu Arg Arg Lys Ser		
	165	

<210> 85
 <211> 166
 <212> PRT
 <213> human alpha interferon

<400> 85
Cys Asp Leu Pro Gln Thr His Ser Leu Gly Asn Arg Arg Ala Leu Ile
1 5 10 15
Leu Leu Ala Gln Met Gly Arg Ile Ser Pro Phe Ser Cys Leu Lys Asp
20 25 30
Arg Pro Asp Phe Gly Leu Pro Gln Glu Glu Phe Asp Gly Asn Gln Phe
35 40 45
Gln Lys Thr Gln Ala Ile Ser Val Leu His Glu Met Ile Gln Gln Thr
50 55 60
Phe Asn Leu Phe Ser Thr Glu Asp Ser Ser Ala Ala Trp Glu Gln Ser
65 70 75 80
Leu Leu Glu Lys Phe Ser Thr Glu Leu Tyr Gln Gln Leu Asn Asn Leu
85 90 95
Glu Ala Cys Val Ile Gln Glu Val Gly Met Glu Glu Thr Pro Leu Met
100 105 110
Asn Glu Asp Ser Ile Leu Ala Val Arg Lys Tyr Phe Gln Arg Ile Thr
115 120 125

Leu Tyr Leu Thr Glu Lys Lys Tyr Ser Pro Cys Ala Trp Glu Val Val
 130 135 140

Arg Ala Glu Ile Met Arg Ser Leu Ser Phe Ser Thr Asn Leu Gln Lys
 145 150 155 160

Ile Leu Arg Arg Lys Asp
 165

<210> 86
 <211> 166
 <212> PRT
 <213> human alpha interferon

<400> 86
 Cys Asp Leu Pro Gln Thr His Ser Leu Gly Asn Arg Arg Ala Leu Ile
 1 5 10 15

Leu Leu Ala Gln Met Gly Arg Ile Ser His Phe Ser Cys Leu Lys Asp
 20 25 30

Arg Tyr Asp Phe Gly Phe Pro Gln Glu Val Phe Asp Gly Asn Gln Phe
 35 40 45

Gln Lys Ala Gln Ala Ile Ser Ala Phe His Glu Met Ile Gln Gln Thr
 50 55 60

Phe Asn Leu Phe Ser Thr Lys Asp Ser Ser Ala Ala Trp Asp Glu Thr
 65 70 75 80

Leu Leu Asp Lys Phe Tyr Ile Glu Leu Phe Gln Gln Leu Asn Asp Leu
 85 90 95

Glu Ala Cys Val Thr Gln Glu Val Gly Val Glu Glu Ile Ala Leu Met
 100 105 110

Asn Glu Asp Ser Ile Leu Ala Val Arg Lys Tyr Phe Gln Arg Ile Thr
 115 120 125

Leu Tyr Leu Met Gly Lys Lys Tyr Ser Pro Cys Ala Trp Glu Val Val
 130 135 140

Arg Ala Glu Ile Met Arg Ser Phe Ser Phe Ser Thr Asn Leu Gln Lys
 145 150 155 160

Gly Leu Arg Arg Lys Asp
 165

<210> 87
 <211> 501
 <212> DNA
 <213> consensus alpha interferon

<400> 87
 tgtgatctgc ctcagaccca cagcctgggt aataggagg ccttgatact cctggcacaa 60

```

atgggaagaa tctctccttt ctctgcctg aaggacagac atgacttttg atttccccag 120
gaggagtttg atggcaacca gttccagaag gctcaagcca tctctgtcct ccatgagatg 180
atccagcaga ccttcaatct cttcagcaca aaggactcat ctgctgcttg ggatgagagc 240
ctcctagaaa aattttccac tgaactttac cagcaactga atgacctgga agcctgtgtg 300
atacaggagg ttgggggtgga agagactccc ctgatgaatg aggactccat cctggctgtg 360
aggaataact tccaaagaat cactctttat ctgacagaga agaaatacag cccttgtgcc 420
tgaggagtgt tcagagcaga aatcatgaga tcttctctt tttcaacaaa cttgcaaaaa 480
agattaagga ggaaggattg a 501

```

<210> 88

<211> 501

<212> DNA

<213> human alpha interferon

<400> 88

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tgtgatctgc ctacagacca cagcctgggt aataggaggg ccttgatact cctggcacaa 60
atgggaagaa tctctccttt ctctgcctg aaggacagac atgacttttg acttccccag 120
gaggagtttg atggcaacca gttccagaag actcaagcca tccctgtcct ccatgagatg 180
atccagcaga ccttcaatct cttcagcaca gaggactcat ctgctgcttg ggaacagagc 240
ctcctagaaa aattttccac tgaactttac cagcaactga ataacctgga agcatgtgtg 300
atacaggagg ttgggatgga agagactccc ctgatgaatg aggactccat cctggctgtg 360
aggaataact tccaaagaat cactctttat ctaacagaga agaaatacag cccttgtgcc 420
tgaggagtgt tcagagcaga aatcatgaga tccctctctt tttcaacaaa cttgcaaaaa 480
agattaagga ggaaggattg a 501

```

<210> 89

<211> 501

<212> DNA

<213> human alpha interferon

<400> 89

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tgtgatctgc ctacagacca cagcctgggt aataggaggg ccttgatact cctggcacaa 60
atgggaagaa tctctccttt ctctgcctg aaggacagac ctgacttttg acttccccag 120
gaggagtttg atggcaacca gttccagaag actcaagcca tctctgtcct ccatgagatg 180
atccagcaga ccttcaatct cttcagcaca gaggactcat ctgctgcttg ggaacagagc 240
ctcctagaaa aattttccac tgaactttac cagcaactga ataacctgga agcatgtgtg 300
atacaggagg ttgggatgga agagactccc ctgatgaatg aggactccat cctggctgtg 360
aggaataact tccaaagaat cactctttat ctaacagaga agaaatacag cccttgtgcc 420
tgaggagtgt tcagagcaga aatcatgaga tctctctctt tttcaacaaa cttgcaaaaa 480
atattaagga ggaaggattg a 501

```

<210> 90

<211> 501

<212> DNA

<213> human alpha interferon

<400> 90

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tgtaatctgt ctcaaacca cagcctgaat aacaggagga ctttgatgct catggcacaa 60
atgaggagaa tctctccttt ctctgcctg aaggacagac atgactttga atttccccag 120
gaggattttg atggcaacca gttccagaaa gctcaagcca tctctgtcct ccatgagatg 180
atgcagcaga ccttcaatct cttcagcaca aagaactcat ctgctgcttg ggatgagacc 240
ctcctagaaa aattctacat tgaacttttc cagcaaatga atgacctgga agcctgtgtg 300
atacaggagg ttgggggtgga agagactccc ctgatgaatg aggactccat cctggctgtg 360
aagaaatact tccaaagaat cactctttat ctgatggaga agaaatacag cccttgtgcc 420
tgaggagtgt tcagagcaga aatcatgaga tccctctctt tttcaacaaa cttgcaaaaa 480
agattaagga ggaaggattg a 501

```

<210> 91
 <211> 501
 <212> DNA
 <213> human alpha interferon

<400> 91
 tgtgatctgc ctcagaccca cagcctgggt aataggaggg ccttgatact cctggcacaa 60
 atgggaagaa tctctccttt ctcatgcctg aaggacagac atgatttcgg attccccgag 120
 gaggagtttg atggccacca gttccagaag actcaagcca tctctgtcct ccatgagatg 180
 atccagcaga ccttcaatct cttcagcaca gaggactcat ctgctgcttg ggaacagagc 240
 ctctagaaa aattttccac tgaactttac cagcaactga atgacctgga agcatgtgtg 300
 atacaggagg ttggggtgga agagactccc ctgatgaatg tggactccat cctggctgtg 360
 aggaaatact tccaaagaat cactctttat ctaacagaga agaaatacag cccttgtgcc 420
 tgggaggttg tcagagcaga aatcatgaga tccctctcgt tttcaacaaa cttgcaaaaa 480
 agattaagga ggaaggattg a 501

<210> 92
 <211> 501
 <212> DNA
 <213> human alpha interferon

<400> 92
 tgtgatctgc ctcagaccca cagcctgggt cacaggagga ccatgatgct cctggcacaa 60
 atgaggagaa tctctccttt ctctgtctg aaggacagac atgacttcag atttccccag 120
 gaggagtttg atggcaacca gttccagaag gctgaagcca tctctgtcct ccatgagggtg 180
 attcagcaga ccttcaatct cttcagcaca aaggactcat ctgttgcttg ggatgagagg 240
 cttctagaca aactctatac tgaactttac cagcagctga atgacctgga agcctgtgtg 300
 atgcaggagg tgtgggtggg agggactccc ctgatgaatg aggactccat cctggctgtg 360
 agaaaatact tccaaagaat cactctctac ctgacagaga aaaagtacag cccttgtgcc 420
 tgggaggttg tcagagcaga aatcatgaga tccttctctt catcaagaaa cttgcaagaa 480
 aggttaagga ggaaggaata a 501

<210> 93
 <211> 501
 <212> DNA
 <213> human alpha interferon

<400> 93
 tgtgatctgc ctcagaccca cagcctgcgt aataggaggg ccttgatact cctggcacaa 60
 atgggaagaa tctctccttt ctctgtctg aaggacagac atgaattcag attcccagag 120
 gaggagtttg atggccacca gttccagaag actcaagcca tctctgtcct ccatgagatg 180
 atccagcaga ccttcaatct cttcagcaca gaggactcat ctgctgcttg ggaacagagc 240
 ctctagaaa aattttccac tgaactttac cagcaactga atgacctgga agcatgtgtg 300
 atacaggagg ttggggtgga agagactccc ctgatgaatg aggactccat cctggctgtg 360
 aggaaatact tccaaagaat cactctttat ctaatggaga agaaatacag cccttgtgcc 420
 tgggaggttg tcagagcaga aatcatgaga tccttctctt tttcaacaaa cttgaaaaaa 480
 ggattaagga ggaaggattg a 501

<210> 94
 <211> 501
 <212> DNA
 <213> human alpha interferon

<400> 94
 tgtgatctgc ctcagactca cagcctgggt aacaggaggg ccttgatact cctggcacaa 60
 atgcgaagaa tctctccttt ctctgcctg aaggacagac atgactttga attccccag 120
 gaggagtttg atgataaaca gttccagaag gctcaagcca tctctgtcct ccatgagatg 180

```

atccagcaga ccttcaacct cttcagcaca aaggactcat ctgctgcttt ggatgagacc 240
cttctagatg aattctacat cgaacttgac cagcagctga atgacctgga gtcctgtgtg 300
atgcaggaag tgggggtgat agagtctccc ctgatgaatg aggacttcat cctggctgtg 360
aggaaatact tccaaagaat cactctatat ctgacagaga agaaatacag ctcttggtgcc 420
tgggaggttg tcagagcaga aatcatgaga tccttctctt tatcaatcaa cttgcaaaaa 480
agattgaaga gtaaggaaatg a                                     501

```

<210> 95

<211> 501

<212> DNA

<213> human alpha interferon

<400> 95

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tgtgatctcc ctgagaccca cagcctggat aacaggagga ccttgatgct cctggcacaa 60
atgagcagaa tctctccttc ctctgtctg atggacagac atgactttgg atttccccag 120
gaggagtttg atggcaacca gttccagaag gctccagcca tctctgtcct ccatgagctg 180
atccagcaga tcttcaacct cttctccaca aaagattcat ctgctgcttg ggatgaggac 240
ctcctagaca aattctgcac cgaactctac cagcagctga atgacttgga agcctgtgtg 300
atgcaggagg agagggtggg agaaactccc ctgatgtacg cggactccat cctggctgtg 360
aagaaatact tccaaagaat cactctctat ctgacagaga agaaatacag cccttggtgcc 420
tgggaggttg tcagagcaga aatcatgaga tccttctctt tatcaacaaa cttgcaagaa 480
agattaagga ggaaggaaatg a                                     501

```

<210> 96

<211> 501

<212> DNA

<213> human alpha interferon

<400> 96

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tgtgatctgc ctcagaccca cagcctgggt aataggaggg ccttgatact cctggcacaa 60
atgggaagaa tctctccttt ctctgcctg aaggacagac atgactttgg atttccccaa 120
gaggagtttg atggcaacca gttccagaag gctcaagcca tctctgtcct ccatgagatg 180
atccagcaga ctttcaatct cttcagcaca aaggactcat ctgctacttg ggaacagagc 240
ctcctagaaa aattttccac tgaacttaac cagcagctga atgacatgga agcctgcgtg 300
atacaggagg ttgggggtgga agagactccc ctgatgaatg tggactctat cctggctgtg 360
aagaaatact tccaaagaat cactctttat ctgacagaga agaaatacag cccttggtgct 420
tgggaggttg tcagagcaga aatcatgaga tccttctctt tatcaaaaaat ttttcaagaa 480
agattaagga ggaaggaaatg a                                     501

```

<210> 97

<211> 501

<212> DNA

<213> human alpha interferon

<400> 97

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tgtgatctgc ctcagaccca cagcctgggt aataggaggg ccttgatact cctggcacaa 60
atgggaagaa tctctccttt ctctgcctg aaggacagac ctgactttgg acttccccag 120
gaggagtttg atggcaacca gttccagaag actcaagcca tctctgtcct ccatgagatg 180
atccagcaga ctttcaatct cttcagcaca gaggactcat ctgctgcttg ggaacagagc 240
ctcctagaaa aattttccac tgaactttac cagcaactga ataacctgga agcatgtgtg 300
atacaggagg ttgggatgga agagactccc ctgatgaatg aggactccat cttggctgtg 360
aggaaatact tccaaagaat cactctttat ctaacagaga agaaatacag cccttggtgcc 420
tgggaggttg tcagagcaga aatcatgaga tctctctctt tttcaacaaa cttgcaaaaa 480
agattaagga ggaaggattg a                                     501

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<210> 98

<211> 501

<212> DNA
<213> human alpha interferon

<400> 98
tgtgatctgc ctcagactca cagcctgggt aataggaggg ccttgatact cctggcacia 60
atgggaagaa tctctcattt ctctgcctg aaggacagat atgatttcgg attccccag 120
gaggtgtttg atggcaacca gttccagaag gctcaagcca tctctgcctt ccatgagatg 180
atccagcaga ccttcaatct cttcagcaca aaggattcat ctgctgcttg ggatgagacc 240
ctcctagaca aattctacat tgaacttttc cagcaactga atgacctaga agcctgtgtg 300
acacaggagg ttgggggtgga agagattgcc ctgatgaatg aggactccat cctggctgtg 360
aggaaatact ttcaaagaat cactctttat ctgatggaga agaaatacag cccttgtgcc 420
tgaggaggtg tcagagcaga aatcatgaga tccttctctt tttcaacaaa cttgcaaaaa 480
ggattaagaa ggaaggattg a 501

<210> 99
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Protease
peptide substrate

<400> 99
Arg Gly Val Val Asn Ala Ser Ser Arg Leu Ala
1 5 10

<210> 100
<211> 44
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Introduced Sfi
I site

<400> 100
ttccatttca tacatggccg aaggggccgt gccatgagga tttt 44

<210> 101
<211> 50
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Introduced sfi
I site

<400> 101
ttctaaatgc atgttggcct ccttggccgg attctgagcc ttcaggacca 50